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Fish Habitat Enhancement Potential And Current Fish Population Assessment of Calais Lake, 1992

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February 1999

PWFWCP Report No. 188

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: A. R. Langston and A. R. McLean. February 1999. Fish habitat enhancement potential and current fish population assessment of Calais Lake, 1992. Peace/Williston Fish and Wildlife Compensation Program, Report No. 188. 13pp plus appendices.

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Fish Habitat Enhancement Potential and Current Fish Population Assessment of Calais Lake

Watershed:	Parsnip River
Date of survey:	June 8 & 9, 1992
Field crew leader:	A.R. McLean
Field assistant:	M. Hunter

Peace/Williston Fish and Wildlife Compensation Program

B. C. Hydro

and

Ministry of Environment, Lands and Parks

Report prepared by: A.R. Langston and A.R. McLean

Released by: _____

Don Cadden, Regional Fisheries Biologist

INTRODUCTION

A reconnaissance level survey of Calais Lake (Figure 1) was completed by the Recreational Fisheries Branch in June of 1977 (Walsh and Hale). The lake has a surface area of 121.9 ha (1.2 km^2), a maximum depth of 25 m and a mean depth of 14.1 m. For further lake data see the 1977 Walsh and Hale report on file at the Ministry of Environment, Lands and Parks, in Prince George.

Calais Lake was evaluated in 1992 by the Peace/Williston Fish and Wildlife Compensation Program to determine it's capability of supporting an Arctic grayling *(Thymallus arcticus)* population. The following are the results from the investigation of June 8 and 9, 1992.

Study Area

Location:	132 km north-west of Fort St. James (Figure 1)		
Elevation:	1021 m +/-		
Latitude/Longitude:	55°24'40":125°22'45"	U.T.M.:	10.3488.61428
Management Unit:	7-28	N.T.S. Map No.:	93N/6 (edition 1)
Watershed Code:	273-70110-35500		
Water Body Identifier:	00453NATR		
Drainage:	Albert C. -> Albert L. -> Albert C. -> Electra L. -> Brûlé C. -> Nation R. -> Williston Reservoir (Parsnip Reach) -> Peace R.		

METHODS

Two sinking "experimental" monofilament gillnets (total length 91.4 m, comprised of six 15.2 m long by 2.4 m deep panels) and 2 minnow traps (overnight sets), were set to determine relative abundance and identification of fish species in Calais Lake.

The potential of the inlets and outlet to support fish was determined through visual observation and the recording of physical data, using standard methodologies outlined in the Fish/ Habitat Inventory and Information Program (1987 Stream Survey Field Guide). The benchmark was located and repainted (Figures 2 and 3). Any change in water level was measured using a Suunto clinometer, a two metre measuring pole and an Eslon tape.

The lake was accessed in the summer and winter by helicopter. No road or trail access currently exists. Winter oxygen data was collected at limno station #1 (Figure 3) using a YSI model 5º Dissolved Oxygen meter.

Photo documentation of the investigation was also completed.

RESULTS & DISCUSSION

BENCHMARK

The benchmark set in 1977 was located. It was originally set 2.0 m above lake level. It is currently 1.56 m above lake level. A 44 cm rise in water level is apparent.

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Figure 1. Calais Lake located 132 km north-west of Fort St. James, British Columbia.

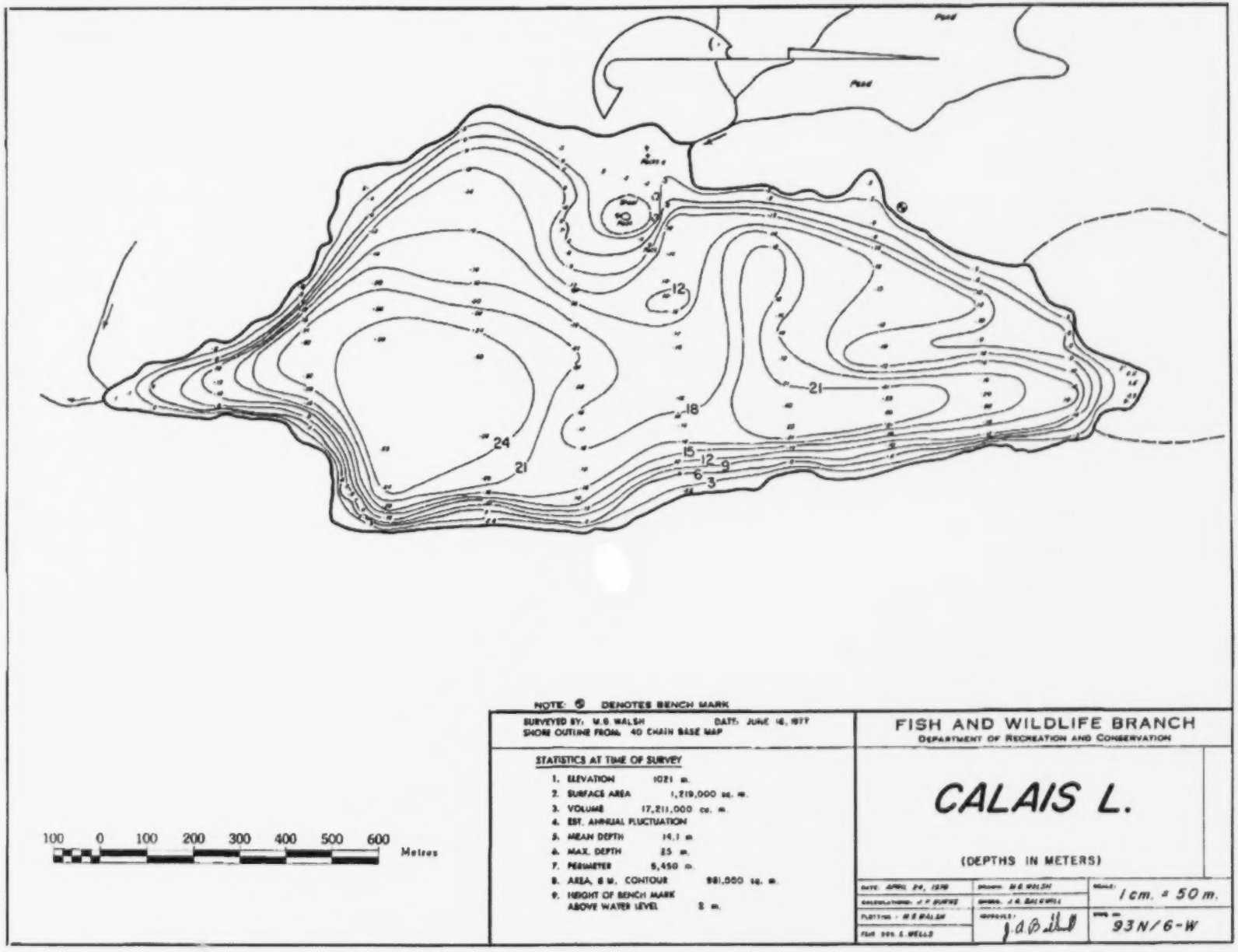


Figure 2. Calais Lake (bathymetry, location of benchmark, inlets and outlets).

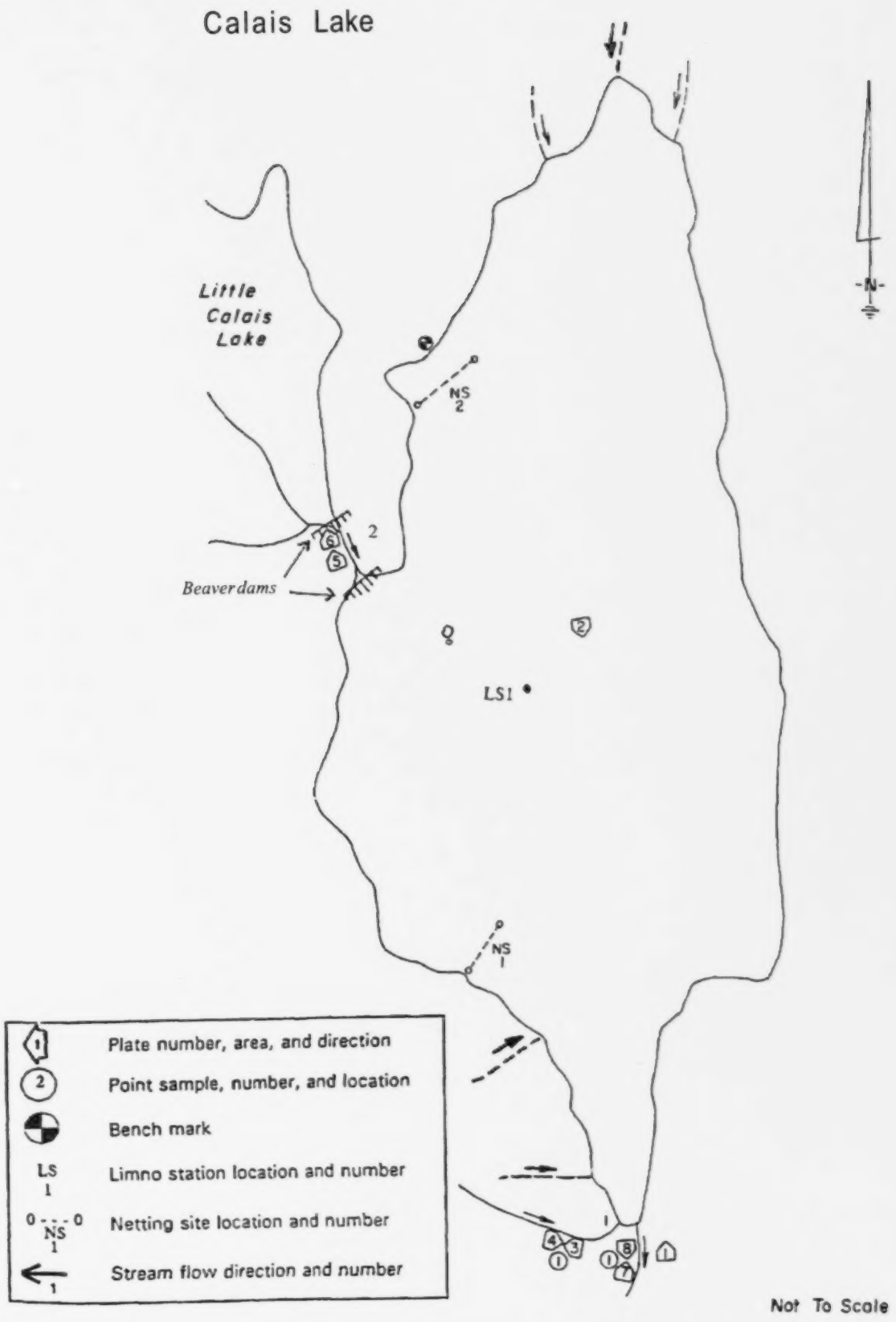


Figure 3. Calais Lake (location of nets, winter oxygen survey, photographs and point sample sites.

NETTING

The net at net site #1 (Figure 3) was set overnight from 19:00 hours to 09:30 hours of the next day for a total of 14.5 hours. The net set at net site #2 (Figure 3) was set overnight from 19:30 hours to 10:30 hours of the next day for a total of 15 hours. The two nets captured a combined total of 105 longnose suckers *(Catastomus Catastomus)* and 55 largescale suckers *(Catastomus macrocheilus)*. No fish were captured in the two minnow traps.

NETTING SITE #1			
Type:	Sinking monofilament		
Date Set:	June 8, 1992	Time:	19:00 hrs
Date Lifted:	June 9, 1992	Time:	09:30 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	0.75 m organics/fines
Deep End Mesh Size:	64 mm	Depth: Substrate:	12.5 m unknown

Comments: Net set off west side of lake to avoid debris and wind.
(mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm)

NETTING SITE #2			
Type:	Sinking monofilament		
Date Set:	June 8, 1992	Time:	19:30 hrs
Date Lifted:	June 9, 1992	Time:	10:30 hrs
Net Dimensions:	Length:91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	1.0 m
Deep End Mesh Size:	64 mm	Depth: Substrate:	8.0 m unknown

Comments: Net set off west side of lake to avoid debris and wind.
(mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm)

Lake Catch Summary

SPECIES	NET SITE NO.				ANGLED	OTHER	TOTAL	NUMBER SAMPLED	NUMBER PRESERVED	SIZE RANGE (cm)
	1	2	3	4						
longnose sucker	88						88			12.5 - 28.5
longnose sucker		17					17			11.0 - 18.0
largescale sucker	36						36			13.0 - 41.5
largescale sucker		19					19			11.0 - 46.0

Minnow Traps:

TRAP #	HOURS	DEPTH (m)	SUBSTRATE	SPECIES	SIZE RANGE (cm)
1	16.75	0.7	fines	nil	
2	16.25	1.0	organics	nil	

Comments: sardines used for bait.

DRAINAGE

Unnamed C. - inlet #1

The initial 250 m were investigated. At a site approximately 250 m upstream from Calais Lake the inlet (draining into the south end of the lake) had an average wetted width of 3.4 m, average depth of 0.45 m, gradient of 1.5%, and a water temperature of 4.5°C. Moderate to good amounts of small spawning gravel suitable for salmonids was observed throughout the creek, however a high fines content (30%) was noted. Juvenile salmonid rearing habitat is good, but presently limited due to the high flows at the time of survey. Refer to point card (Appendix A) for additional information.

Albert C. - inlet #2

This inlet flows (300 m) from Little Calais Lake into the north-western side of Calais Lake. It has an average wetted width of 25 m, average depth of 1.5 m, water temperature of 9.5°C and a field gradient of 0.1 %. A beaver dam (60 m in width by 0.2 m in height) is located at the creek mouth (Calais Lake). A second dam is located 300 m upstream from Calais Lake, which controls the lake level of Little Calais Lake. These dams are not barriers to fish passage. The stream between the two dams is artificially wide, deep and slow moving due to the impounding effect of the dam located at the mouth of the creek just prior to its entry into Calais Lake. This meandering inlet has no salmonid spawning potential, but affords good rearing potential in the form of large woody debris, instream vegetation, overstream vegetation and undercut banks.

Intermittent inlets (5)

The intermittent inlets afford no fisheries potential.

Albert C. - outlet C.

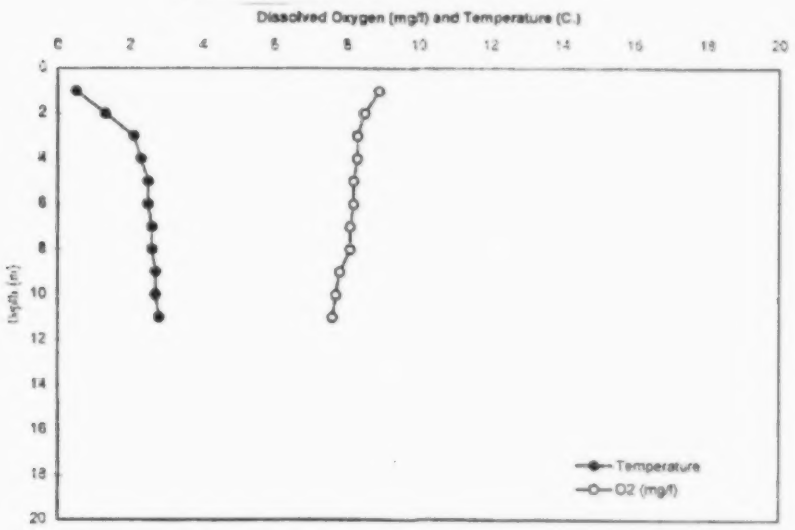
The initial 600 m of the outlet was investigated. Albert Creek, exits the south end of the lake. Approximately 100 m downstream from Calais Lake the creek had an average wetted width of 18 m, average depth of 1.2 m, and a field gradient of 0.5% (estimate). A small creek (low spawning potential) enters at the right bank of Albert Creek approximately 500 m downstream from the lake. Albert Creek affords a very small amount of low quality (high fines content) spawning habitat, however good rearing habitat was observed in the form of LWD, instream vegetation, overstream vegetation, and undercut banks. Refer to point card (Appendix A) for additional information.

WINTER OXYGEN/TEMPERATURE DATA

Winter oxygen and temperature data were collected March 4, 1992. The ice thickness at the sampling location was 0.82 m and the water depth was 12.3 m (Figure 3).

Depth (m)	Oxygen (mg/L)	Temperature (°C)
surface*	-	-
1.0	8.9	0.5
2.0	8.5	1.3
3.0	8.3	2.1
4.0	8.3	2.3
5.0	8.2	2.5
6.0	8.2	2.5
7.0	8.1	2.6
8.0	8.1	2.6
9.0	7.8	2.7
10.0	7.7	2.7
11.0	7.6	2.8

*surface referenced from top of ice.



FISHERIES MANAGEMENT COMMENTS

Calais Lake currently supports a population of longnose and largescale suckers. Inlet #1 affords moderate to good salmonid spawning habitat (30% fines) but limited rearing habitat (due to high flows at time of survey). A low water temperature of 4.5°C was also noted at Inlet #1.

Calais Lake was evaluated in order to determine its capability of supporting an Arctic grayling population. Calais Lake is a suitable candidate for an Arctic grayling introduction. Most of the spawning activity should occur in inlet #1. Inevitably, some grayling will leave the lake system, potentially populating lakes (Albert, and Electra) and the Nation River further downstream.

If a grayling transplant program is initiated for this lake, a follow up survey should be conducted to determine if an increasing, self sustaining population is established.

Post Survey Note: Little Calais Lake was chosen as the site for an Arctic grayling transplant as opposed to Calais Lake. Little Calais was selected for three reasons. Due to it's smaller size it was believed increases in the grayling populations resultant of the transplant would be easier to observe. The inlet of Little Calais Lake contained more of the habitat believed to be suitable for Arctic grayling spawning than the inlets of Calais Lake. Additionally, Little Calais Lake was further upstream in the watershed, reducing the likelihood of emigration of transplanted Arctic grayling back to the Nation River. Sixty two adult Arctic grayling were transplanted to Little Calais Lake in 1992. A further 25 adult Arctic grayling were transplanted to Little Calais Lake in 1993.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys;

A reconnaissance level survey of Calais Lake was completed by the Recreational Fisheries Branch in June of 1977 (Walsh and Hale). The report is on file at the Ministry of Environment, Lands and Parks, in Prince George.

Other Related Surveys;
None known.

REFERENCES

DFO/MOE. 1987. Stream Survey Field Guide. Fish Habitat Inventory and Information program. 33p.

Walsh and Hale. 1977. Unpublished lake survey data. Data on file at Ministry of Environment, Lands and Parks, Prince George office.

PHOTOGRAPH DIRECTORY

(location and directional view of each photo is available on Figure 3).

Negative #	Plate #	Description
R4:17	1	Aerial view of Calais Lake looking north. Arrow indicates Little Calais Lake.
R5:10,11	2	Panoramic view looking south, taken from middle of lake.
R5:3	3	Upstream view of sample site #1, on inlet #1, taken approx. 250 m upstream from lake.
R5:2	4	Downstream view of sample site #1, on inlet #1. Taken approx. 250 m upstream from lake.
R5:17	5	Upstream view at typical site on inlet #2. Taken approx. 170m upstream from lake.
R5:13	6	Upstream view of beaver dam located 300 m upstream from Calais Lake (inlet #2). This dam controls the current lake level in Little Calais Lake (located in background).
R5:6	7	Upstream view of sample site #1, on outlet. Taken approx. 100 m downstream from the lake.
R5:7	8	Downstream view of sample site #1 on outlet. Taken approx. 100 m downstream from the lake.

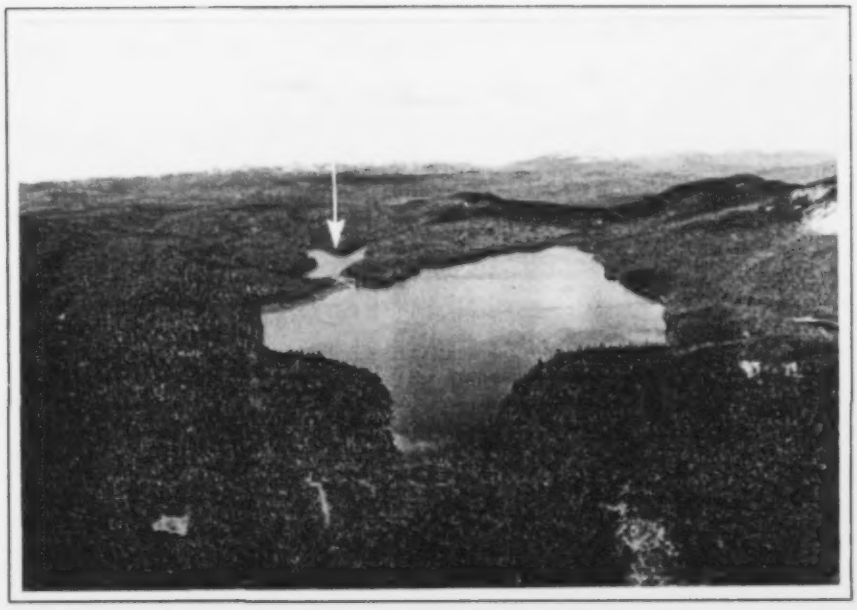


Plate 1: Aerial view of Calais Lake looking north. Arrow indicates Little Calais Lake.

Plate 2: Panoramic view looking south, taken from middle of Calais Lake.

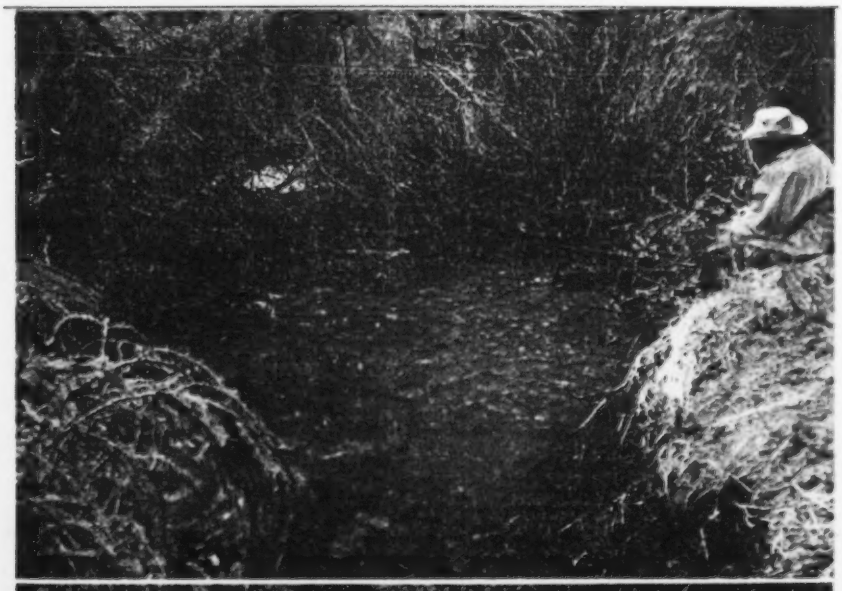


Plate 3: Upstream view of sample site #1, on inlet #1, taken approx. 250 m upstream from Calais Lake.

Plate 4: Downstream view of sample site #1, on inlet #1. Taken approx. 250 m upstream from Calais Lake.

Plate 5: Upstream view at typical site on inlet #2. Taken approx. 170 m upstream from Calais Lake.

Plate 6: Upstream view of beaver dam located 300 m upstream from Calais Lake. This dam controls the current water level in Little Calais Lake (located in background).

Plate 7: Upstream view of sample site #1, on outlet (Albert Creek). Taken approx. 100 m downstream from Calais Lake.

Plate 8: Downstream view of sample site #1 on outlet (Albert Creek). Taken approx. 100 m downstream from Calais Lake.

Appendix A

TRIBUTARY STREAM DATA

System Name: **Unnamed C.** **inlet #1**

System No.:

Site Location: Sample Site #1, located approx. 250 m upstream from the lake.

Date:	June 9, 1992	Time:	1455 hrs
Channel Width:	3.4 m	Water Temp.:	4.5 °C
Wetted Width:	3.4 m	Stage (flow)	high
Max. Depth:	6 cm	Velocity:	1.1 m/sec
Avg. Depth:	45 cm	Field Gradient:	1.5 %
Turbidity:	6 cm	Colour:	tannic

Flood Signs:

Height: 95 cm

Type: debris

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
30 %	25 %	45 %	-- %

Boulder	Bedrock
-- %	-- %

Substrate Compaction:low Sand: 90 %

Banks:

	Form	Height	Stability
Right	straight	0.55 m	stable due to rooted vegetation
Left	straight	0.6 m	stable due to rooted vegetation.

Comments:

Velocity and field gradient measured over 7 m.
Moderate to good spawning potential noted, but high fines content (30%).
Spawning gravel laterally compressed, not rounded.
Rearing habitat is good (large woody debris, instream vegetation, overstream vegetation, undercut banks), but presently limited due to high flows.

System Name: **Albert C. outlet**

System No.:

Site Location: Sample Site #1, located approx. 100 m downstream from the lake.

Date:	June 9, 1992	Time:	1 630 hrs
Channel Width:	35 m	Water Temp.:	9.5 °C
Wetted Width:	18 m	Stage (flow)	high
Max. Depth:	180 cm	Velocity:	0.6 m/sec
Avg. Depth:	120 cm	Field Gradient:	0.5 % (estimate)
Turbidity:	180 cm	Colour:	tannic

Flood Signs:

Height: 10 cm

Type: debris

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
85 %	10 %	-- %	-- %

Boulder	Bedrock
5 %	-- %

Substrate Compaction:low Sand: 50 %

Banks:

	Form	Height	Stability
Right	straight	1 m	stable due to rooted vegetation
Left	straight	1 m	stable due to rooted vegetation.

Comments:

Velocity measured over 5 m.
Very low spawning potential.
Good rearing potential.
The initial 600 m of the outlet were investigated.